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The Brass Founder and Finisher and Electro Platers Review.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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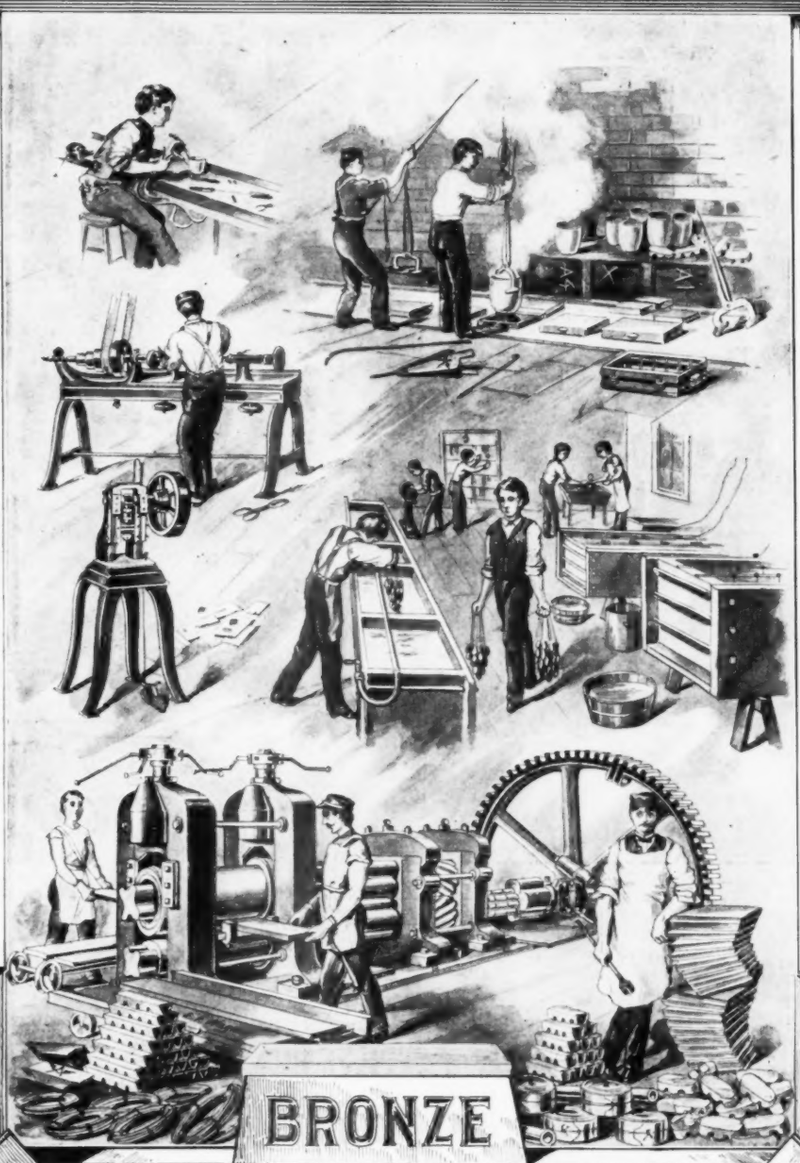

BRONZE

OLD SERIES
Vol. IX., No. 7
Vol. I. No. 7
NEW SERIES

LABOR OMNIA VINCIT

JULY, 1903

NEW YORK.

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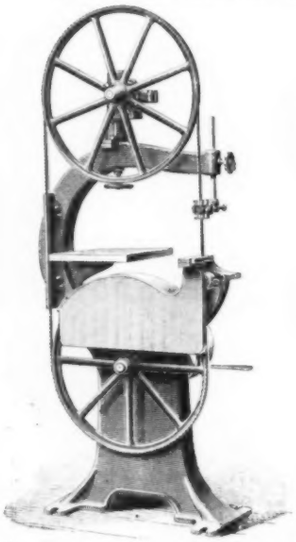

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THE METAL INDUSTRY
AND
THE ALUMINUM WORLD
AND
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

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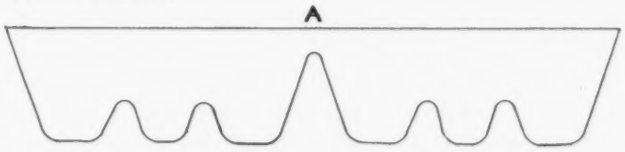
THE NEW SHAPES OF COPPER INGOTS

In our May issue we called attention to the proposed change in shape of copper ingots. This transition has already commenced, and ingots of the form of the subjoined sketch have found their way into many channels of the market.



The only essential difference between such ingots and those of the present form is at the web "A." The new form of ingot is, in reality, two ordinary ingots joined by this web. The metal may be easily cut at this point, as the web is only about one-half an inch thick.

While this form of copper ingot is advantageous to the copper refiner, it does not appear to possess any for the brass manufacturer. The only remark that we have heard in its favor from the latter has been in connection with the difficulty with which it could be stolen; an experience which nearly all manufacturers have had. We are pleased to say, however, that it is not met with as frequently as formerly.

THE INCREASING USE OF ZINC

Although zinc has long been known, its early uses were almost entirely confined to the manufacture of brass or kindred alloys; at that time its employment alone for various articles was not undertaken. Such retarded use was undoubtedly brought about by the difficulty of rolling or casting the somewhat impure metal which was made at that time, and it was only the advent of pure metal that rendered possible the present extensive use of zinc. The present common grades of spelter, which undoubtedly are on a parity with the metal produced in the early history of the zinc industry, will neither roll into sheet nor cast in metal molds.

When it was found that, by slightly heating the plates of zinc, they could be rolled into sheet, many uses for such

material were found, but only in the form of simple sheet metal goods, such as stove boards, wash board covering, or roofing. The production of still more highly refined material made possible the production of stamped, spun and drawn work until, at the present time, an endless variety of small work of such description is made. Even the manufacture of difficult work is now carried on in the production of such work as eyelets or shapes which, heretofore, required a good grade of drawing brass for their successful fabrication. Zinc appears to work so well under the drawing press that the manufacture of cartridge shells from sheet zinc has been patented. Even nails are now made from zinc, and are used in connection with the use of this metal for roofing purposes. They will stand the operation of driving into soft wood fully as well as those made from copper and, of course, are much cheaper.

For casting in metal molds zinc is replacing, to a large extent, the various soft metals such as the tin or lead alloys. It has the advantage of being quite stiff and takes a good polish; qualities which the lead alloys do not possess. Only the very highest grade of spelter can be used for such metal mold casting, and even with employment of this grade many difficulties are encountered. We believe, that, with a more highly refined grade of zinc even more difficult shapes could be made.

The use of zinc in roofing is being rapidly extended, and gives excellent service. In spinning, zinc gives good results, and manufacturers are beginning to find that they can use it for many of the requirements that, hitherto, only brass would fill.

A new preparation of zinc which came on the market some time ago is that which is in the form of nickel-plated sheets. These sheets can be used for a majority of purposes, but we have recently heard of complaints being made on account of the nickel peeling off when the sheet is stamped. This is to be expected, as nickel is hardly a sufficiently soft metal to stand this heroic treatment. However, the field for this nickel-plated zinc is so alluring that one of the large zinc rolling mills, we understand, is about to begin its manufacture.

THE USE OF SPECIAL STEELS IN BRASS WORKING

By special steels we mean those which are either self-hardening or are hardened by other means than that employed to produce a cutting edge on the ordinary grade of tool steel. The principle upon which these special steels work is the fact that they are hard in themselves, and the temper is not removed when they become heated as it is in the case of the usual grades of tool-steel. In cutting metals with the common qualities* of tool-steel the speed and feed is limited to the amount of heat which is produced by the friction of the tool and metal. With the special steels this difficulty is not troublesome, as the tool will cut, even though it does become hot. There is no temper to be removed. This quality, therefore, renders the special steels very useful, but we regret to say their use is confined to roughing cuts or work not requiring a finish, as the edge on such steels is not maintained with the keenness that it is on the usual grade of tool steel. The use on finished work or in cutting threads or similar work is not possible, but there are many other cases in the brass industry where the special steels may be quite advantageously employed. In the sand casting industry their use in taking heavy roughing cuts on the lathe or planer is a great saving in time, but the finishing must be completed with ordinary tool-steel. In the rolling mill special steel is particularly serviceable in the overhauling or scraping machine, as there is no required size for the work, nor is a smooth surface necessary. By the use of steel, therefore, that will not have its temper withdrawn, a high speed and heavy cut may be given to the tool. We can safely say, in this connection, that the use of special steels for overhauling brass has become standard practice.

*Not a poor quality, we do not wish to infer, but the grade which requires quenching for the purpose of hardening.

OIL FUEL FOR MELTING SILVER OR GOLD

The use of gas or oil for fuel in melting gold or silver or their alloys possesses one advantage which we believe is often overlooked when an equipment is installed. This is the absence of any ashes or cinders to be taken care of. In melting brass the cinder problem is a very important one, and some mills have from 50,000 to 100,000 pounds of washed metal per month. Of course, in washing this material a large amount of metal is lost in tailings. In the case of silver or gold the cinders would require washing in the same manner, but constant vigilance would be necessary to avoid loss of precious metals. Special appliances, unnecessary in the brass industry, would be required which would mean constant expense for maintenance, and even with such care and watchfulness much metal would be lost. The use of gas or oil, we are pleased to say, obviates any such requirements, and even though a much more expensive fuel than coal or coke the balance is very largely in favor of these fuels when the loss of precious metals is taken into consideration. The majority of precious metals are melted in crucibles, and these will oftentimes leak through pin-holes or slight, unnoticed cracks; or the crucible will spill over when removed from the fire; or splashing take place when metal is put in. In the use of gas or oil furnaces the metal simply runs down into the bottom and may be readily removed. We believe that these advantages are now pretty widely appreciated, and the use of coal or coke for melting precious metals is not increasing, although such fuels possess certain distinct advantages over gas or oil.

Nickel silver contains no silver, but is simply German silver containing 25 per cent. of nickel.

NEW PROCESS OF ROLLING COPPER, YELLOW-METAL AND NAVAL BRASS

By H. J. Martin, Swansea, Wales.

In the manufacture, hitherto, of copper plates, sheets or bars, the crude material has been refined in the refining furnace, and thence ladled into molds in the form of cakes. These, of which there are usually four or five cast into each mold, are afterward allowed to cool down before they are removed from the molds, generally not until next day, so that the heat that had been contained in the whole furnace charge of copper plates is absolutely wasted.

The new process consists of the utilization of this heat (resulting from the refining operation) for the purpose of rolling the metal in the preliminary stages, such as "breaking down" and "drawing on," and thus doing away with the re-heating now employed for these operations in the existing mode of manufacture, this being facilitated by ladling the cakes from the refining furnaces, singly, into special, reversible, tipping molds, and when sufficiently set, immediately tipping them from their molds and then conveying them as expeditiously as possible by suitable appliances, to the breaking-down rolls where they are rolled up to an advance stage ready for the re-heating and rolling of the finishing operation only, and thus doing away to a very great extent with the costly reheating in heating furnaces at present practiced.

By the use of the patent tipping molds, which have permanent copper plates for their bottoms, the necessity of ladling the copper layer or bottom into each mold before the cake itself is ladled in on to it, as at present, is obviated entirely, and therefore, also, the remelting of same resulting in great saving of labor, fuel and time besides also increasing the net yield of the refining furnace. For the heavier cakes necessary for large plates the copper is ladled into molds which have detachable sides, the bottom being a copper plate forming the top of the car, which latter would be employed for transferring the cakes from the refinery direct to the table in front of the breaking-down rolls.

When the preliminary rolling of the cake has been carried out by means of the initial or refinery heat and rolled down to any convenient or predetermined thickness, then these broken down plates or bars may be cooled, examined and cleared of any defect before being sheared to weight and re-heated in a heating furnace, preparatory to being rolled in the finishing operation in the finishing rolls, so that this latter re-heating only would usually be required for the bulk of general work. But even this may be dispensed with also, for a large number of products such as hoops or heavy bars and plates, as some of these may be finished completely and quite easily, as far as the rolling is concerned, by means of the original molten refinery heat.

Now, in the frequent re-heating at present practiced, unless great care is exercised, the copper often becomes overheated, and is burned in parts through irregular heating, which is often the cause of many after complaints and rejections and wrongly attributed to bad quality in consequence of the presence of original impurities in the copper), and if the workmen have been very negligent, a large amount has to be taken back to the refinery to be remelted and refined afresh; the risk of such waste would be nearly altogether avoided in the new process on account of the refinery heat bing taken advantage of instead of that due to so much re-heating in heating furnaces and at the same time found to be ample and highly suitable, the interior portions being hotter than the exterior and so reversing the present conditions. Further, in heating much grit, dirt and dust is gathered by the products being heated and carried over by the draught from the fire place, all of which results in the specks, etc., on the surface having to be chipped out or scraped, causing roughness in addition to the burnt parts; this would also be avoided in the new process and also a most important diminution of the great waste caused by oxidation of the surfaces of the products being operated upon, through the continual heating and cooling which they undergo at present, and so again effecting considerable saving. The risk of still greater waste and expense is also prevented, as now often occurs, through its being sometimes found that some of the cakes from the refinery do not possess the tough pitch quality, probably through the refining furnace having "gone back" during the ladling operation, and now only discovered after the cakes have been allowed to cool down, been reheated and perhaps had much work done on them, only to be sent back to the refinery to be remelted and refined afresh; this circumstance could not occur in the new process, for the simple reason that the loss of quality in any particular cake would be at once detected, after being ladled, by the roller manipulating at the rolls, by its behavior in withstanding the rolling stress and, if the rolling quality be not up to the mark, affording the refiner the immediate opportunity and time to alter or improve the pitch of the copper in the furnace, before other cakes were ladled out that were bad; the rolling, in fact, being a continuous test for the refiner's guidance.

Further, the new system would have the effect of enabling the workmen and the machinery to vastly augment the output of the mill, principally by doing away with their enforced idleness, brought about by waiting for the heating of products in heating furnaces, and again to cause orders to be executed with much greater dispatch, and more especially so in the case of those articles which can be finally finished, as far as the rolling is concerned, by means of the initial or refinery heat.

The process, described above, is also in its manufacture applicable to the manufacture of alloys, such as Yellow or Muntz Metal, Naval Brass and the like important alloys which can be rolled in a hot state; these mixtures, whether melted and mixed in furnaces or crucibles, would be, by the new mode, afterwards poured into suitable tipping or detachable molds in the shape of plates or bar ingots, and as soon as they were sufficiently set would be immediately tipped or stripped from the molds and conducted without loss of time to the rolls, where they would be "broken down," and, if necessary, "drawn on" in the bulk of general work. They would then be allowed to cool, and are now ready for treatment in the ordinary way in the "finishing stage," and all this work would have been advanced thus far by simply utilizing the heat contained in the plates or bar ingots, in the original molten condition, thus enabling all the rolling to be performed (excepting only that of the "finishing stage") without re-heating of the metal; so that, as in the case of copper before mentioned, a very important saving of labor, fuel, time, plant and space is effected as well as the avoidance of any risk of the remelting of the plates and so forth, with its attendant expense, a condition which may happen when the metal is mixed in furnaces, in consequence of the different proportion of the various metals in the alloy being sometimes lost through excessive volatilization of the spelter therein; this would be at once discovered at its arrival at the rolls by rolling only a single plate, before others were cast into the mold, and in time, if the pitch

of the metal, to rectify the mixture at once, instead of, perhaps, much greater loss through casting the whole furnace charge into the mold as plates and allowing them to cool down, before work had been performed on them to find the rolling qualities, and which, after being subsequently re-heated and rolled, were found to be bad, requiring re-melting of the whole at great expense.

It will be seen that this system offers a very rapid and continuous means of turning out work, the consideration of the time factor alone being of the utmost importance, also the fact of the different operations becoming much more continuous brings about as a result the capability of greatly increasing the output of any mill, and this, too, without augmenting the plant.

Another consideration of the greatest value which might be submitted with this system is that the interior metal of the copper cakes should, after they have been ladled and become sufficiently set, be in a sort of pasty or plastic condition, and whilst being subjected to the pressure of rolling in this state, the metal must coalesce or weld together more perfectly, and so would acquire better physical properties, such as a denser or more homogeneous condition or structure, and in consequence might give better results, in the mechanical tests for tensile and ductile strains, etc.

In installing a new plant for the more successful carrying on of this process, however, it would be advisable to have the different set of "breaking down" rolls included, perhaps, in one group handily situated contiguous to the refinery, so that the cakes or ingots may be expeditiously fed to the rolls, by suitable appliances, without any unnecessary loss of heat in their transmission. Although, with proper facilities in existing plants, the cakes may be taken considerable distances without very appreciable loss of heat.

To derive the fullest advantages from the process, of course, copper manufacturers should also be refiners of the metal, and for working current orders in the mill the cakes issuing from the refinery would be dealt with as before described. If it happens that the cakes are not required in the finishing mills, but must be put into stock and at the same time the refinery must be kept going, then these cakes or bars would be "broken down" to certain established widths or lengths by means of the initial or refinery heat instead of allowing it to be wasted after being ladled. They would then be advanced a good deal towards completion, and have had the advantage of a good deal of work put into them whilst in the semi-plastic condition, before being allowed to cool, thus insuring soundness of the metal and might then be put on one side to be ultimately finished into different kinds of work to exact dimensions to suit orders. In the case of those manufacturers who buy their raw product in the shape of cake copper, they could instead be supplied with the unfinished product, such as "broken down" plates or bars, which, having been worked on to some extent, and showing very little defect, would be somewhat of a guarantee to the final manufacturer that he was receiving material of good quality: whilst in the case of these copper refiners who may possess no manufacturing plant, they would necessarily have to erect "breaking down" mills in order to supply the above requirements, and would undoubtedly find it well worth their while to do so, being enabled, as they are, to take advantage of the heat that is now wasted. They would, in fact, be doing pretty much the same thing as steel makers are now doing in unfinished products, such as selling billets to the final manufacturer.

The above process has been evolved and proved after a long, practical and intimate experience of the trade and its great importance to copper manufacturers, who are also refiners of the metal, as well as the manufacturers of such important alloys as yellow-metal and naval brass (which can be rolled hot), will be readily appreciated when it is estimated that by its adoption with the accessory apparatus that at least twenty per cent. to thirty per cent. may be saved in the present mill costs of manufacturing ordinary "strong copper," and that even more than this can be achieved in the case of these products which can be rolled to a finished state without any re-heating whatever. The molds used for receiving the copper cakes have, as before stated, permanent copper bottoms, which better resist any tendency to buckling by heat, produce less pin holes, are capable of being rapidly tipped or stripped as well as possess other advantages. In conjunction with the process they were patented by the late T. H. Martin, formerly for many years engineer and manager of the Morfa Works, Swansea, Wales.

SUMMARY OF ADVANTAGES DERIVED BY THIS PROCESS.

1. Doing away with re-heating for the rolling in the "breaking-down" and "drawing-on" stages, thus effecting very important economy of labor, fuel, time, etc.

2. Doing away with the casting of copper bottoms in the molds before the cakes are ladled in; therefore, obviating the melting of same, besides increasing the net yield of the refinery.

3. Avoiding the over-heating and burning of sheets and plates in heating furnaces (the cause of many complaints and rejections) and also the re-melting of same as well as preventing an accumulation of grit, dirt and dust on the surfaces, with the resulting chipping and scraping made necessary.

4. Avoiding to a great extent the large waste by oxidation of the surfaces of products through the repeated heating and cooling they are subjected to at present, resulting in a considerable diminution of the oxide formed.

5. Doing away of the risk of great waste caused sometimes by the loss of the "tough-pitch" in certain of the cakes being ladled from the refining furnace, only discovered at present, perhaps, after the whole charge has been ladled out and allowed to get quite cold and the cakes have been re-heated and rolled when they have turned out bad, necessitating the re-melting of these cakes in order to be refined afresh after considerable labor has been expended on them; whereas, in the new process, should any particular cake while in the rolls disclose this want of "tough-pitch" rolling quality, by not properly withstanding the rolling stress, then the refiner would immediately take the necessary steps to improve the pitch of the copper in the bath of the furnace before other cakes were ladled out that were not up to the mark and so insure that nothing is rolled but what is in the proper pitch.

6. Vastly augmenting the output of a mill through the work of the different operations being made much more continuous, brought about principally by doing away with the enforced idleness of the workmen and machinery, caused by waiting for the heating of the products in heating furnaces, and also by causing orders to be executed with much greater dispatch.

7. And showing great soundness and compactness of the metal in consequence of working on it whilst the interior is still in a soft or semi-plastic condition; also producing a decided improvement in the appearance of the finished product.

8. Economizing in plant and space and thereby in initial outlay, by doing away with certain of the heating furnaces, etc.

A NEW PROCESS FOR UNITING METALS

The fact that copper may be welded to itself by means of suitable fluxes has long been known. Many processes have been patented and many methods proposed for accomplishing such an end, but with the exception of the electric welding process there has, as far as known, never been any industrial application of this art.

Fig. 1

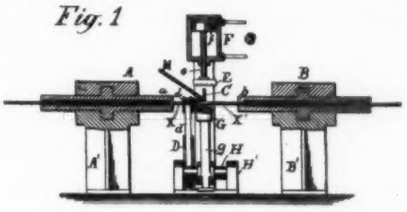


Fig. 3

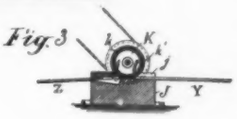


Fig. 2

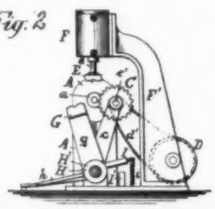
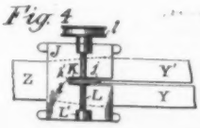


Fig. 4



Alexander Dick, of London, England, will known as the inventor of Delta metal and the Extrusion method, has recently brought out and assigned to The American Brass Company,* of Waterbury, Conn., a process for welding copper, brass, aluminum or their alloys. The inventor states that this process is applicable to such metals as hitherto had been supposed to be free from any welding properties, and were only capable of being welded by melting or soldering. The principle of this invention is as follows: When copper or copper alloys, aluminum or aluminum alloys or other metals or alloys are separated at a temperature corresponding to the nature of the alloy (for brass, for instance, at a red-heat of about 500° centigrade) and are then exposed immediately to a strong pressure, while by shutting off the air, or by employing a non-oxidizing gas casing, an oxidation of the faces to be united is avoided, the contact faces can completely be united together. In other words, the metal is cut off or severed in a non-oxidizing atmosphere, so that there is no possible chance of oxidation, and the application of strong pressure unites the metals.

In carrying out this process the two outer ends to be united (if, for instance, wires or rods are to be welded) are cut off by means of circular saw or similar appliance. The cuts are then pressed against the faces of the saw until this tool is removed, and then are immediately pressed against each other and at the same time jumped. The two ends are then worked by means of a hammer or swage. Sheet metal is operated upon in the same manner. Means are taken to hold the ends, which are severed, by the use of clamps, so that they will not upset. Additional rolling or drawing may often be required to smooth down any ridge which may have been produced during the hammering or swaging process.

In the accompanying drawings the process is illustrated. Fig. 1 is the apparatus for joining wire or rods. A and B are chucks for holding the rods while being operated upon. X and X¹ are the rods to be united, while C is the circular saw used for severing the ends. This circular saw has a reciprocating motion, as shown in Fig. 2. E is a steam hammer used for hammering the rods after they have been cut. M is a pipe through which any non-oxidizing gas such as hydrogen or coal gas is blown upon the work being cut.

In Figs. 3 and 4 is the apparatus employed to unite sheet metals. A die J is used in conjunction with this appliance through which the metal is drawn immediately after being cut and in such a manner that much pressure is applied.

*Comprising the following companies, viz.: The Coe Brass Co., Torrington, Conn.; The Benedict & Burnham Co., Waterbury, Conn.; The Waterbury Brass Company, Waterbury, Conn.; The Holmes, Booth & Haydens Company, Waterbury, Conn.; The Ansonia Brass and Copper Company, Ansonia, Conn.

SEAMLESS TUBING IN GERMANY.

According to Consul-General F. H. Mason, of Berlin, there are seventy-seven manufactories of tubing in Germany; many of which are large establishments and equipped with every facility for turning out a product in the cheapest possible manner and on a large scale. Of course many of these establishments manufacture steel tubing, but among them there are many who make brass, copper and other alloys in the form of seamless tubes. He says that the Mannessmann process of rolling seamless tubes and the Ehrhardt system by which seamless tubes are drawn by forcing a mandrel under hydraulic pressure through a block of metal are both German inventions and are worked with notable success in Germany. He also says that the Robertson and Elmore patents for making brass and copper tubes are employed under the most advantageous circumstances.

Among the uses of tubing he states that the manufacture of bedsteads has become one of large magnitude in Germany. They are made wholly of iron or steel tubing, of the same tipped and decorated with brass and nickeled mountings, or wholly of brass tubing; the latter, of course, being the most expensive and adapted to luxurious households. Single iron bedsteads sell from $1.19 to $6.00; those with brass or bronze ornaments from $6.00 to $24.00; while those made from brass entirely bring from $24.00 to $95.00.

METALS IN THE HOUSEHOLD.

Professor Lehmann has reported on the significance of the hygienically important metals, aluminum, lead, copper, nickel, tin and zinc, in the household and in the food branches, at the meeting of the German Verein fuer oeffentliche Gesundheitspflege. Actually injurious and dangerous are lead and all lead preparations. Mercury poisoning in the household is too rare to deserve any mention. The poisonousness of copper, zinc and tin is very slight and greatly exaggerated by some authors. Silver, aluminum, iron and nickel may be called entirely harmless. Despite the slight hygenic value of all heavy metals, excepting lead and quicksilver, all endeavors to keep these metals away from our ailiments, especially preserves, should be assisted.—*Neueste Erfindungen und Erfahrungen.*

A new use has been discovered for zinc. It has been found that a small piece of zinc placed in a fire will keep the chimney free from soot. It is understood that this fact has been known for some time in localities where soft coal has been burned in house stoves, but the use of soft coal during the previous winter in sections which have hitherto used anthracite have revealed the existence of such a use for this metal. Just what action takes place is not well understood, but it is probably more mechanical than otherwise.

THE CASTING OF GERMAN-SILVER FITTINGS FOR THE PLUMBING TRADE

It is a condition much to be deplored that, in the plumbing trade, the extensive use of solid white metal tubing is not followed by the employment of fittings such as tees, elbows, couplings, etc., made of the same or equivalent metal as the tubing. The use of exposed plumbing and the fitting of lavatories after modern ideas has called for metals which will withstand the constant polishing so necessary for the maintenance of cleanliness, and, for this reason, a company put upon the market some time ago a solid white-metal tube which will withstand any amount of polishing, and is not subject to the inconveniences of nickel-plated tube after such treatment. This tubing* is composed of 80 per cent. of copper and 20 per cent. of nickel, and is known as cupro-nickel. Of course, the high price at which this is necessarily sold prevents its competing with nickel-plated brass tube, but the demand for it in high-class plumbing work is constantly increasing, and well it should be, for there is no more unsightly metal work than brass from which the nickel plating has partially worn off. We have found that in many cases this cupro-nickel was specified in contracts, but nothing was said about the fittings, and nickel-plated brass was used. The plating, of course, soon wore away, leaving the brass underneath. Now, this state of affairs occurs on account of the difficulty of casting German-silver, but all such difficulties as occur in casting this metal may be obviated if a little aluminum, the smallest amount acting better than a large, is added to the German-silver just before casting. At the same time one-half pound of lead should be added to make the metal cut free when being threaded. The amount of aluminum which should be added should not be larger than a hickory nut for a No. 25 crucible. Scrap German-silver may be used, and gives equally as good results as new metal, but care should be taken to avoid getting a German-silver low in nickel, as the color is then yellowish. An 18 per cent. German-silver answers well. If one desires to make the mixture from new metal then the following proportions may be used:

Copper	61.50 lbs.
Nickel	18.00 lbs.
Zinc	20.00 lbs.
Lead	0.50 lb.
Aluminum	0.25 lb.

This alloy casts remarkably well, turns free, and is of an excellent color. It does not need to be cast at as high a heat as German silver, and runs quite sharply.

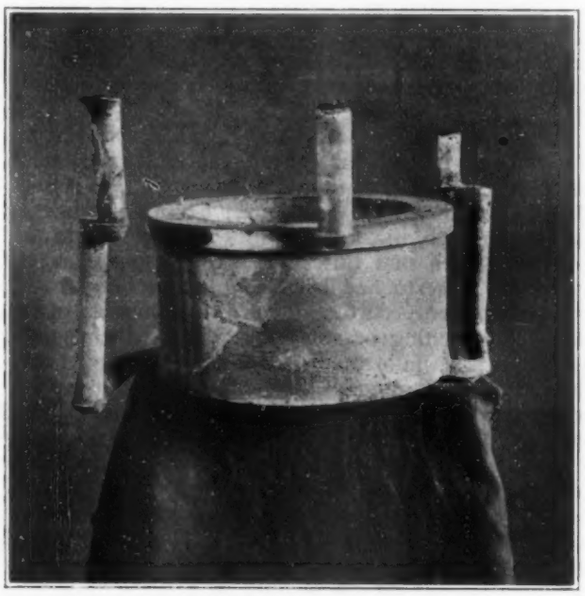
*Benedict-Nickel.

SEASONED CRUCIBLES

It is a fact just beginning to be appreciated, that crucibles will show a much longer life or greater number of heats if they are allowed to "season." The large brass manufacturers buy a year's supply ahead and allow them to "season" on the top of a muffle furnace. One manufacturer recently informed us that he had tested the strength of this belief by taking two lots of crucibles out of the same shipment. One lot were used immediately and the others were allowed to season. The seasoned lot showed nearly double the number of heats that were obtained on those which were used at once. We think, however, that this is rather of an abnormal case, and that the average crucible user will not obtain quite so much disparity of results. The fact remains, though, that a much longer life is obtained by "seasoning" sufficient, at least, to warrant laying in a plentiful supply.

CASTING METAL FROM THE BOTTOM

There is no better method of gating sand castings than from the bottom, although there is invariably a tendency on the part of the molder to dispense with the extra labor involved and gate in the easiest place. In gating from the bottom a horn gate, such as shown in our January number in the method of casting large bronze valves, is the most satisfactory, but in many cases this necessitates a vast amount of additional labor. In the figure we show a large gun metal bearing, which was cast in green sand from the bottom. It is always well to put an offset on the gate, as shown in the cut, to break the fall of metal as much as possible. A small riser was taken from the top to allow the air to pass out. A good idea in gating is to fillet the junction of the gate and casting. This is shown in the figure and such a procedure prevents the metal from drawing in at this particular place, a frequent occurrence if the fillet is not put in. Many a casting is rendered unsatisfactory and in many instances ruined by omitting to do this. It is an easy matter for the molder to thumb around the entrance to the casting and produce this fillet.



PHOSPHOR BRONZE CASTING, MADE IN GREEN SAND AND SHOWING METHOD OF GATING.

This casting was made from the following mixture, viz: Copper, 80 per cent.; tin, 9 per cent.; lead 9 per cent.; zinc, 1.9 per cent.; phosphorus, 0.1 per cent. A slight liquation of the lead took place. The weight of the casting was 525 pounds.

PHOSPHOR TIN IS NOT DUTIABLE.

The Board of U. S. General Appraisers have reversed the decision of the Collector of Customs at Plattsburg, N. Y., and sustained the protests of the importers, F. W. Myers & Co., as to the rate of duty of phosphor-tin. It is, therefore, entitled to free duty. An analysis by the government chemist showed this particular phosphor-tin to consist of 98.80 per cent. of tin and 1.17 per cent. of phosphorus. The importers claim that many varieties of tin contain phosphorus, antimony or lead added to give certain qualities, so that all are known as tin and sold as such.

AN ACCURATE SCALE FOR BRASS FOUNDERS' USE

The increasing need in the brass foundry for accurate weighing in small quantities renders it imperative that an accurate scale should be employed for this purpose. The platform scales usually found in the brass foundry, while answering admirably for all ordinary work, are not sufficiently sensitive for the weighing of a quantity, such as an ounce or two. Yet the founder often desires to weigh this amount, or even smaller, and is forced to weigh it on the scales that are used for heavy weighing. He might as well guess at it, as such an operation would be fully as accurate.

E. S. Sperry* has already called attention to this fact, and a further description of a scale suitable for this class of work will undoubtedly be of interest, especially when it is known that many brass founders desire such a scale but are not cognizant of its existence. The scale particularly adapted for these requirements, and at the same time inexpensive, is called the Robervahl scale. Its sensibility is about one one-hundredth of an ounce, a limit which is fully sufficient for all needs. The scale is shown in Fig. 1.

FIG. 1.

The capacity is 5 pounds in each pan, and the pans are 6 inches in diameter.† The weights are separate from the scale, and for this reason either avoirdupois, metric or troy weights may be used. The avoirdupois, however, are the ones generally employed, as metal is bought and sold and the mixtures made by this system.

The weights are usually furnished in a wooden block, as shown in Fig. 2. A set with a range of 4 pounds to

FIG. 2.

one-eighth of an ounce will be ample for the purpose.‡ Heavy weighing, of course, is done on other scales.

The Robervahl type of scale will be found much more convenient and fully as accurate for brass founders' use than the old type of ore balance with the overhanging beam, for there is nothing to interfere with the rapid placing of material on the pans.

Metals cast under pressure are invariably more homogeneous and of a closer grain than when no pressure is applied. This explains why a high riser on a casting always acts favorably.

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*This Journal, February, 1902. Page 94

†The price of this scale is about $5, exclusive of weights.

‡Such a set of weights cost $5.50.

THE FOUNDRYMEN'S CONVENTION

The Convention of the American Foundrymen's Association, held at Milwaukee last month, was one of the most successful and interesting meetings ever held by the association. About 400 delegates were present, consisting mostly of foundry owners. The foundry foremen's section was also well attended. Many valuable and interesting papers were read and discussed, all of which were educational. The social and entertaining features were all that could be desired. A considerable interest was manifested in other metals besides iron by many of the large iron manufacturing concerns, for many of these are finding it necessary to install their own brass foundry.

The selection of a city for holding the next convention was left to the Executive Committee. The officers elected for the ensuing year are: President, Willis Brown, Walker Foundry Company, Erie, Pa.; vice-presidents: First District, John Magee, Magee Furnace Company, Chelsea, Mass.; Second District, J. A. Becket, Hoosick Falls, N. Y.; Third District, John McLaren, Phillips & McLaren, Pittsburgh, Pa.; Fourth District, A. K. Beckwith, Estate of P. D. Beckwith, Dowagiac, Mich.; Fifth District, C. J. Wolff, L. Wolff Mfg. Company, Chicago; Sixth District, Adam W. Bair, Chicago, Milwaukee & St. Paul Railway Company, Milwaukee, Wis.; Seventh District, J. P. Golden, Golden Foundry and Machine Company, Columbus, Ga.; Eighth District, T. J. Best, Warden, King & Son, Limited, Montreal, Canada. Secretary and treasurer, Dr. Richard Moldenke, New York City.

The following recommendations were approved: That Charles H. Thomas, Newark, N. J., be made chairman of the Foreman's Section, and James A. Murphy, Erie, Pa., secretary; that W. G. Scott, Racine, Wis., be made chairman of the Metallurgists' Section, and H. E. Field, Ansonia, Conn., secretary, and that Mr. Field be selected by the Executive Committee as assistant to Secretary Moldenke.

METALLIC PACKING

Metallic packing is now being used to a great extent for packing piston rods of steam engines and similar work. The alloys sold are similar to genuine Babbitt metal. An analysis of one of the leading brands is as follows, viz.:

	Per Cent.
Tin	88.12
Copper	7.96
Antimony	3.92

We do not find that lead is used to any extent in these alloys. It is necessary that the metal be hard to avoid the danger of sticking to the piston rod.

Iron molds are preferable to those of brass for casting babbitt metals, as there is less liability of the metal adhering to the mold. This does not happen, of course, if the metal is not poured at too high a temperature, but such a difficulty often occurs, and we have seen a brass mold injured by such treatment. With cast iron there is no danger of the metal, even when poured quite hot, sticking to the mold.

Brazing solder consists of equal parts of copper and spelter.

SOME NOTABLE DIFFERENCES BETWEEN THE ENGLISH BRASS TRADE AND THAT OF THE UNITED STATES

The majority of the English brass products find a market similar to our own, but there is one outlet which, it is believed, is not yet obtained by the brass manufacturers of the United States. We refer to the African division of the industry to which very large quantities of brass in a large diversity of forms are regularly exported and exchanged for the products of this tropical country. There has always been, among this African population, a liking for anything of a golden color and brass, therefore, has become a form of money. Birmingham, in England, the center of the English brass industry, is often called the "savages' mint," and the manufacture of this money gives employment to many people.

The money, if it may be called such, consists of two kinds. One a copper alloy termed "Manillas" is rather peculiar in shape. It is a rather thick ring about two inches long with the ends turning inward. The weight is about two ounces. The color resembles the ordinary English penny. The mixture appears to be one which must be kept within narrow limits as the Africans insist upon its being the right color, correct in shape, and possessing a musical "ring." It must also allow of being broken in the hand. It is quite amusing to find such rigid specifications for brass in this barbarous country. The other form of money is in the shape of brass rods of the usual alloy. Yellow brass answers perfectly for this. These rods are a standard article for export to this country; in fact, in the price lists of the English brass makers "Kaffir Rods" are regularly listed just as carefully as low brass or gilding is in our own country. These rods are straightened and their value depends entirely on their length.

Another peculiar phase of the English brass industry is the manufacture of brass coffins for the native chiefs of Africa. These are made of solid brass and are of large dimensions, suggesting that the chief desires some of his favorite wives buried with him. The dimensions are usually 8 feet long, 3 feet deep and 4 feet wide. The coffins are provided with lids and several padlocks both inside and out, which shows that the desire is manifested to lock himself in. The coffins are highly ornamented and polished. The weight of such "standard" coffins is about 700 lbs. Having no recognized currency, the chiefs are obliged to barter whatever will be taken in exchange for them. Usually gold dust or elephants' tusks are exchanged, but a case is noted in which several thousand monkey skins were traded for one of these coffins.

Another interesting feature of the Birmingham brass trade is the manufacture of cast brass idols and gods for these colored heathen. Such articles are only made, it is said, by the smaller manufactories and "are not carried in stock, but only made on order." We do not find these listed in the English brass lists, but from the peculiarity of such an industry, shall expect to find them later. Idols with two pair of arms will probably be listed at twice the cost of those with one and there will undoubtedly be "no charge for tinning."

It is interesting to note that there is now considerable antagonism springing up in England against the selling, by a Christian country, of such emblems of idolatry and paganism. It has been brought about by the various religious organizations in that country, but we cannot say how far reaching its influence is up to the present time.

THE THEORY AND ADVANTAGE OF BURNISHING

The term "burnishing" is one which is usually misapplied. Ordinarily it is used in the sense of polishing, when in reality the present methods of polishing do not consist of burnishing at all, but are either grinding or buffing processes. Burnishing is an old process and while in former times it was applied to all metals, it is now restricted to gold and silver. Nickel is too hard to be susceptible to the burnishing tool and copper and brass do not need it. In the case of gold and silver, however, the burnishing process is an extremely valuable one; in fact, it has often been said that the difference between good and bad silver plate (provided, of course, the same weight of plate is put on) lies in the burnishing.

The operation of burnishing as ordinarily conducted consists in smoothing down the surface of a plated article by means of a very hard steel or bloodstone burnisher. Considerable pressure is employed and the tool is lubricated with soap solution. The hand burnisher is made in various shapes in order to conform to the shape of the article, and the surface is very highly polished so as to slide over the surface of the plate and not tear it. An ordinary form of hand-burnisher is shown in Fig. 1.

FIG. 1.

In the case of spoons a machine is used, as the work is entirely uniform. The tool is automatically disengaged after giving the requisite number of strokes. The machine is shown in Fig. 2.

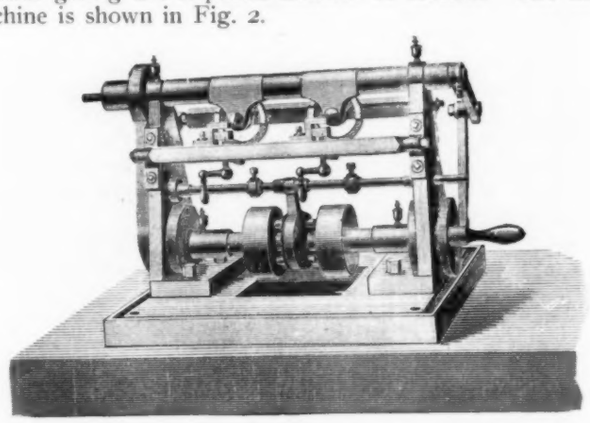


FIG. 2.

In electro-plating the deposit is almost invariably of a crystalline nature, and if a plated article be examined under a powerful lens the surface will be seen to consist of small crystals or spines and the whole will present a somewhat porous or spongy nature. If such a plate is polished by buffing without the intervention of burnishing, the crystalline nature of the plate is not materially changed, but the surface is simply ground off. The burnisher, however, when properly applied, not only destroys this crystalline structure but hardens the surface as well. In fact, the results of burnishing are somewhat analogous to hammering or rolling, so that in the case of a silver-plated spoon which has been burnished the life of the plating is much longer than it otherwise would be if only a simple buffing was given it. This process of burnishing, however, does not give a uniformly polished surface, but leaves small streaks, ridges and scratches on the sur-

face, caused, of course, by the overlapping of the strokes of the burnisher. To obviate such marks it is now customary, after the process of burnishing is completed, to buff the article with rouge and a rag buff in order to get that absolutely smooth and uniform surface found on silver goods at the present time. This last operation is called "coloring," on account of the fact that the true color of the silver is brought out by the process. In the manufacture of the cheap classes of plated ware the operation of burnishing is dispensed with on account of its cost.

LARGE STERLING SILVER SHEETS

The firm of Handy & Harman, Bridgeport, Conn., who already possess an enviable reputation in the quality of their silver anodes, are beginning to achieve the same notoriety as regards their sterling product. They have recently rolled some sterling silver sheets 46 x 46 inches x No. 14 B & S. gauge, which, as far as known, are the largest sterling silver sheets ever made. These dimensions, of course, are the finished sizes and a very much wider sheet was required in rolling. The difficulties in rolling wide metal are not generally appreciated, and this firm is to be congratulated on the quality of the metal which was produced.

A NEW ROLLING MILL

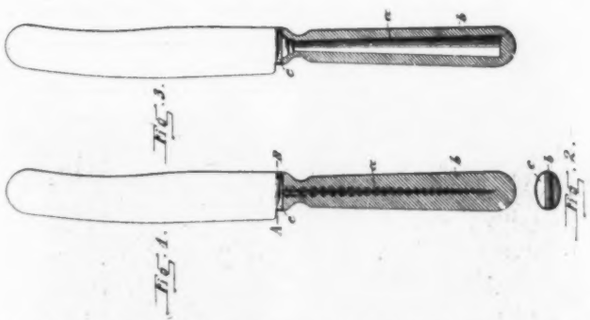
The Victor Metals Company, of East Braintree, Mass., are building a rolling mill to roll the alloys manufactured by the company. Among these alloys are the "Victor non-corrosive silver metal," which is said to withstand the action of all acids except nitric, and "Victor bronze," which, when cast, is claimed to have a tensile strength of 65,000 pounds, with 39 per cent. elongation, and when in the form of rods, a tensile strength of 77,000 pounds and 29 per cent. elongation. The company will roll these alloys into sheets and rods and eventually draw wire and tubing. The mill will be 100x 50 feet, and the foundation is now being laid. The size of the company's foundry is 130x40 feet. The plant is situated near the New York, New Haven & Hartford Railroad. It is expected to have the rolling mill in operation by October 1. The officers of the company are: Victor C. Lassen, president; Eric Ewertz, treasurer; Chas. G. Shephard, secretary, who with Lewis Nixon and Joel F. Shepard, comprise the board of directors.

The United States Customs officials of New York have unearthed a scheme for smuggling pierced diamond wire dies into the country by means of mails coming through small postoffices in Connecticut. These diamond dies are used for drawing the finer sizes of all wires, as they do not "cut out" like steel dies. Such diamonds are worth about $4 per carat when drilled, and they are subject to an ad valorem duty of 10 per cent. as "diamonds drilled, but not set." Competitors of the parties who were doing the smuggling, it is said, brought the matter to the notice of the New York officials.

The Watson-Stillman Company, of New York, have just issued Catalogue No. 65, which replaces a similar work issued four years ago. The new catalogue has 72 pages of illustrations, being an increase of 28 pages over the old one. Additional tools have been added in all of the departments of the Watson-Stillman Company. Their specialty is hydraulic tools, and they also build miscellaneous machinery.

MAGNALIUM FOR TABLE KNIVES

The new alloy called Magnalium (consisting of a combination of aluminum and magnesium) is beginning to find industrial applications. One of the more recent uses is in the manufacture of handles for table knives or similar wares. Many materials have heretofore been employed for this purpose, notably celluloid, hard rubber, bone, horn and woods of various kinds. These all become loose after a time, and to obviate such a difficulty Hermann Joest, of Hanover, Germany, has commenced the use of magnalium for this purpose. Ordinary metals are too heavy for this purpose, but the lightness of this alloy of aluminum and magnesium would seem to fit it particularly for the purpose.



In Figs. 1 and 3 are shown the method of fastening. The blade of the knife is provided with any suitable tang (one which provides the best anchorage is the most suitable), and around it the magnalium is cast. A suitable mold is used for the purpose, and the alloy adheres very closely to the tang; in fact, it is said to act like a solder in this respect, so that the applicability may readily be appreciated. In Fig. 2 is shown a section of the knife through the line A—B. The white color of magnalium and its susceptibility to several beautiful finishes would seem to adapt it to this particular use.

THE AMERICAN ALUMINUM ASSOCIATION

At the last convention of the American Aluminum Association, held at Pittsburgh, September 20, 1902, it was decided to hold the 1903 meeting at New York, and the first Wednesday in September was suggested as the date for holding the meeting. An inquiry sent to the members of the association requesting an opinion on the exact date and other matters brought forth replies from nearly all of the members and the majority favor Wednesday, September 2, as the date for the convention. We herewith print a few of the suggestions:

"We know that the meeting of last year has done a great deal of good, inasmuch as it has taken off the edge of competition considerably, and has eliminated many mean features to the benefit of all. We will attend in 1903."

"I expect to be present at the 1903 meeting, and think another officer of our company will come with me. I think the Association ought to plan for a good shore dinner at one of the beaches, as some of our Western people do not have a chance to get them."

The above replies express the sentiment of the different membrs, and arrangements will be made for holding the third annual convention of the American Aluminum Association at New York September 2.

Charles C. Krome, of Schoharie, N. Y., writes us that he will exhibit a lot of aluminum goods at the County Fair.

THE PECULIAR BEHAVIOR OF A NICKEL ANODE

Our attention was recently called to the peculiar behavior of a nickel anode as indicating the difficulties and abnormal conditions which are often encountered in the electro-plating industry. This anode was the usual form of such material, and had been cast in sand with a small amount of aluminum introduced to give soundness. The addition of aluminum to nickel anodes, by the way, has become a useful and standard practice, as blowholes are eliminated to a large extent and a clean surface produced on the casting. Whether the small amount of aluminum which is added to the nickel has a deleterious effect on the working of the anode in the bath we cannot say, but the fact that it acts very favorably on the casting qualities in sand is well established.

PECULIAR BEHAVIOR OF A NICKEL ANODE

This particular nickel anode which is herewith illustrated was used in the usual double sulphate of nickel and ammonia bath, but had not been in the solution for a great length of time before a thin skin began to peel off from the outside. As the use became continued a thin sheet, shown in the left-hand side of the cut, actually fell away from the parent anode. This sheet was about .005 in. thick, and consisted entirely of bright, unattacked metal. No such condition existed on the other side of the anode, but the whole surface, both underneath the thin sheet which peeled off and on the reverse side, was covered to a depth of an eighth of an inch with a brown powder, which fell off when the anode was dry. This powder was very fine, and had every appearance of being a precipitated salt of iron. In fact, our first impression was that this anode was very impure, and the abnormal amount of iron had separated out. This powder was entirely attracted by a magnet, which indicated that it was metal, and not any salt or precipitate of iron. An analysis of this powder, however, gave 11.87 per cent. of metallic iron with the balance principally nickel, which indicates that it was practically of the same in composition as the parent anode. The analysis of the nickel anode gave the following results, viz.:

Nickel—91.81 per cent.

Iron—7.54 per cent.

Silicon, Carbon, Aluminum, Manganese—Not determined.

This analysis shows that the anode is an ordinary quality of commercial nickel, but was apparently subject to more or less disintegration. We do not know the conditions under which it was used further than those which we have above stated, but we are under the impression that the aluminum in the anode may have caused the difficulty of disintegration, although this is the first case where our attention has ever been called to the difficulty occuring in practice. It has been found,* however, that an alloy of equal parts of nickel and aluminum cast in any form, either in sand or in metal molds, will actually fall to powder within a few months without any external influence. Whether other proportions of nickel and aluminum will do this is unknown, but we simply give this fact as an indication that such an explanation may be plausible. A rigid investigation would be necessary in the case of the anode in order to prove that such a phenomenon caused it. We would suggest, however, that the anode makers keep down the amount of aluminum which they add to the lowest possible limit.

COPPER-PLATING SOLUTION

For copper-plating iron or spelter (zinc) the most satisfactory results are obtained by the use of the cyanide bath. This bath is made as follows, viz.: Dissolve one-half pound of sulphate of copper (blue vitriol) in one quart of water and allow to cool. Now add sufficient ammonia to dissolve the precipitate formed and produce a clear blue solution. Add one quart more of water and next a strong solution of cyanide of potash until the blue color disappears and the solution has a yellowish brown tint. This bath works best at a temperature of about 120° Fahrenheit.

NEW BOOKS—MODERN ELECTROLYTIC COPPER REFINING

—By Titus Ulke. Illus., 165 pp.; John Wiley & Sons, New York. 1903. Price, $3.

No other metallurigcal industry is conducted with such secrecy as that maintained in the refining of copper by the electrolytic method. This is, perhaps, natural, as the industry is comparatively modern and has been and is now the source of enormous revenue to the owners. It is not customary to allow visitors in the works, and each refinery has somewhat different methods, so that one who has been fortunate enough to be brought in contact with each of the refineries must be an ideal person to write about this industry. The author, then, is peculiarly fitted for the work, both from scientific training and personal contact with the works.

The work principally consists in individual descriptions of each electrolytic plant, not only in the United States, but in the world. A directory of all these plants is given, and shows that there are now ten in operation in the United States, six in Great Britain, nine in Germany, two in Austria-Hungary, four in France, two in Russia and one in Japan. The description of the foreign plants is somewhat meagre. A good description, however, of the manufacture of copper tubes by the Elmore process at the Leeds Copper Works, Leeds, England, is given.

The book is well written and is profusely illustrated with some twenty photographs as well as numerous drawings. The treatment of the slimes and recovery of the gold and silver therefrom receives less attention than it should, as this is quite an important division of the industry. This book will not only prove of value to the copper people, but to the brass manufacturers as well, as the latter consume a large proportion of the electrolytic refineries' product.

*Disintegration of an alloy of nickel and aluminum.—E. S. Sperry, Trans. A. I. M. E., 1899.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—A party asks how powdered magnesium may be melted. He states that when he has tried to melt it the whole mass takes fire and burns, leaving a white mass.

A.—Powdered magnesium cannot be melted. The very fine state of division renders this impossible, as magnesium is so readily oxidized. Magnesium is used, of course, for the production of fireworks and the preparation of flash light powder used in photography. Magnesium may be purchased in ingot form from Eimer & Amend, of New York. Such large masses may be melted under a flux of 3 parts of potassium chloride and 4 parts of magnesium chloride. As this flux is lighter than magnesium the metal will sink to the bottom and not float and burn as it will when the usual heavy fluxes are used.

Q.—A brass founder would like to know a mixture for making furniture trimmings which require but little strength and is cheap.

A.—The manufacture of furniture trimmings or hardware does not require particularly good metal, but care must be taken to obtain a uniform color. Nothing appears more unsightly than to see part of one article a different color than the other. This, of course, may easily be maintained by keeping the mixture uniform. The large furniture hardware manufacturers in the East use large quantities of scrap, but of a quality that they are sure is uniform. Old wire cloth from paper mills, skeleton brass sheet or similar material is always uniform. A miscellaneous assortment of scrap will not give good results.

A cheap mixture, and one of a good color, is as follows, viz.:

Copper	6 lbs.
Spelter	4 lbs.
Lead	¼ lb.

Just before the metal is ready to pour, add a small piece of aluminum about the size of a hickory nut. The castings will come out very clean, are quite stiff, and possess a good color. If more stiffness is required, the amount of spelter may be increased. Tin is unnecessary in this mixture.

Q.—A rolling mill in Germany asks information in regard to the casting of manganese bronze. They say: "We have lately been experimenting with manganese bronze, and have tried casting the following alloy:

Copper	92.5 per cent.
Manganese bronze	7.5 per cent.

"We have, however, been unable to secure a clean, easy-pouring material, and all the usual means of reduction, such as using phosphorus, charcoal, etc., have failed. Kindly give us what information you can in regard to the difficulty."

A.—Our correspondent neglects to say whether he wishes to cast the mixture in iron molds or in sand, and in order to speak intelligently on the subject it is necessary to know this. A mixture which may work well in sand will not do so in iron molds. Such a condition actually does exist in the case of manganese bronze, as all the varieties of sand casting mixture contain aluminum, added to render the mixture capable of being cast in sand, as without it the strong, close-grained mixture could not be obtained. If this mixture is used for casting in iron molds, poor castings invariably result. In order to answer this question, therefore, we will be obliged to take both sides.

Assuming that our correspondent desires to use the above mixture for casting in sand, his difficulty is probably in the absence of the required amount of aluminum. Manganese bronze intended for casting in sand contains about one-half of one per cent. of aluminum, and therefore the quantity of aluminum which would exist in the above mixture would only be about 0.03 per cent.—an amount entirely too small for the purpose of giving soundness. At least one-half of one per cent. should be added, and soundness will be increased if even more is added. The increase of this amount of aluminum, then, is what is necessary for making sound sand castings. Such a large amount of copper, however, as exists in this mixture renders it a difficult alloy to cast in sand.

In the other case, we must assume that our correspondent desires to cast the mixture in metal molds for the purpose of rolling into sheet or rods. In this case, paradoxical as it may seem, aluminum is a great detriment, and if present will render the casting dirty and full of dross. This is because the oxide of aluminum cannot be reduced by the oil which is necessary in casting in iron molds. It may be possible, therefore, that this aluminum may cause the trouble, as even a few hundredths of one per cent. will bring it about. In this case, accordingly, we would advise our correspondent to procure some manganese bronze free from aluminum or of the quality used for making sheet. We gave an analysis of this grade of manganese bronze in our June issue.

THE FARADAY SOCIETY

The Faraday Society has been formed recently in London for the object of studying electrochemistry, electrometallurgy, chemical physics, metallography and kindred subjects. The first meeting of the society was scheduled for July 1, and the proceedings of all meetings will be published in the *Electrochemist and Metallurgist*, which is to be issued monthly free to members. It is also hoped that every member will either receive free of cost or for a small charge a copy of the transactions of the American Electrochemical Society. Negotiations are now pending towards that end. The officers of the Faraday Society are: President, J. W. Swan; treasurer, F. Mollwo Perkin; secretary, F. S. Spiers. The headquarters are at 82 Victoria street, London, S. W.

The Grand Rapids Metal Workers' Association is the title of an organization formed at Grand Rapids, Mich., which includes many of the leading manufacturers of that city. Among the brass firms who are members are: Wolverine Brass Works, Grand Rapids Brass Company, Keeler Brass Works. The officers are: President, Frank A. Baldwin, vice-president, W. R. Fox; treasurer, Louis A. Cornelius; secretary, Daniel W. Tower. The purpose of the organization is to effect a better understanding between employers and employees.

L. Lawrence & Co., 292 Halsey street, Newark, N. J., made recently two aluminum mixing tanks 18 feet long, 1 foot wide and 2 feet deep. The tanks were for the Edison Phonograph Company, who use them for mixing wax.

TRADE NEWS

The Crestline Manufacturing Company, Crestline, O., are introducing a new seamless brass pump cylinder.

The Excelsior Needle Company, of Torrington, Conn., manufacturers of wire swaging machines, are about to make two additions to their plant.

The Cream City Smelting and Refining Works, of Milwaukee, is being enlarged and additional equipment is being installed.

The National Brass and Iron Works, of Reading, Pa., are about to occupy their new brick factory, and are already putting in a 250-horse-power engine.

The Traut and Hine Company, of New Britain, Conn., manufacturers of brass novelties, are installing a new 100 H. P. power plant.

The Central Brass Works Company, of Kansas City, Mo., have been incorporated, with a capital stock of $50,000, by Adolph A. Dora, W. Prier and Walter P. Prier.

The Hoyt Metal Company, of St. Louis, Mo., whose rolling mill was recently destroyed by fire, are about to rebuild. The loss of $30,000 to their plant was fully covered by insurance, and none of the other buildings were damaged.

Rundle-Spence Manufacturing Company, of Milwaukee, manufacturers of plumbers' supplies and brass goods, have recently started up their iron foundry, which has been standing idle for several years.

Brooks Brothers' Brass Company, of Buffalo, N. Y., have been incorporated, with a capital of $10,000, to manufacture metal wire. The incorporators are Louis B. Hart, Robert W. Pomeroy and George C. Miller.

The Joseph McGee Brass Foundry Company, of New York City, have been incorporated, with a capital of $1,200, by Frederick Russell, of Flushing, L. I.; Charles H. Lephart, of Long Island City, L. I., and George Buchanan, of New York City.

The Lanyan Zinc Company recently put on the market a new brand of spelter, which is meeting with excellent success. The brand is known as "Brass Special," and is made according to specifications of one of the leading Naugatuck Valley rolling mills.

The Scovill Manufacturing Company, of Waterbury, Conn., announce the success of the increase of their capital stock from $2,500,000 to $3,250,000. The whole increase of $750,000 has practically all been subscribed in cash and taken entirely by Waterbury people. No dividend will be paid on the stock until October 1, when it is expected that the usual quarterly dividend of two per cent. will be declared.

The brass foundry of Robert Mitchell & Co., Montreal, Canada, was recently destroyed by fire.

The Auburn Reduction & Smelting Furnace Company, of Auburn, N. Y., have under consideration the installation of a wire drawing plant.

The plant of Edson F. Smith & Sons, of Union City, Conn., manufacturers of small brass goods, was destroyed by fire on June 22.

The Pittsburgh Cast Iron Brazing Company has been organized to exploit the brazing process controlled by the American Brazing Company, of Philadelphia.

The Composite Metal Company, of Catasauqua, Pa., are erecting a new plant for the manufacture of castings. Brass and bronze castings will be manufactured as well as iron.

The North and Judd Company, of New Britain, Conn., are to erect a large addition to their already extensive plant. This company manufacture an extensive line of buckles and harness trimmings, both in iron and brass.

The Sessions Clock Company, who have absorbed the E. N. Welch Company, of Forestville, Conn., are to make large additions to their plant. They expect to expend about $250,000 in such additions.

The Central Brass Foundry, of Cleveland, are building a large addition to their plant, which will enable them to increase their facilities for the manufacture of their present line of plumbers' supplies.

The Norwich Nickel and Brass Company, Norwich, Conn., in consequence of their greatly increased business in the manufacture of display fixtures, spun work and electro-plated goods, have increased their capital stock.

The Johnson Electric Service Company, of Milwaukee, has just completed their new building, and will have, among other things, a well-equipped brass foundry. Their machining department will also be up to date in the way of brass working machinery.

The Pittsburgh Piping and Equipment Company, of Pittsburgh, Pa., has recently been organized by G. H. Danner, C. R. Ball and J. K. Smith, all formerly with the Best Manufacturing Company. They will manufacture a line of brass and bronze castings in addition to their other business.

J. Bishop & Co., of Malvern, Pa., manufacturers of platinum, whose works were destroyed by fire some time ago, are beginning a new factory, which will be equipped with entirely new machinery and appliances for the working of platinum. This company has been in existence since 1842.

TRADE NEWS

Light aluminum castings can be obtained from The Freeport Brass Foundry, Freeport, Ill.

It is reported that rapid progress is being made in the new plant of The Rome Metal Company, which is being erected at Rome, N. Y.

The Hawley Down Draft Furnace Company, of Chicago, report the sale of two furnaces to the San Francisco Mint, to be used in melting gold and silver bullion.

The Colonial Refining Company, of 934 North Third street, Philadelphia, buy the ashes and skimmings from brass furnaces. Don't throw these waste products away.

Free samples of "Syracuse Phosphor Tin" are given out by the Syracuse Smelting Works, 94 Gold street, New York City.

The Hanson and Van Winkle Company, of Newark, N. J., Chicago and New York, issue a 200-page illustrated catalogue showing all of the platers' and polishers' supplies manufactured and sold by this company.

In the electro-magnetic separator manufactured by the Elm City Engineering Company, of New Haven, Conn., all of the working parts are so arranged or covered that they cannot become clogged or injured.

Upon the receipt of $2, The New Era Manufacturing Company, of Kalamazoo, Mich., will deliver, prepaid to any address within the United States, a five-pound sample lot of "Metallic Phosphoro."

Daniel Whelan, who has a metal warehouse at Killerig, Tullow (County Carlow), Ireland, writes us that there is a growing demand in Ireland for aluminum goods.

The Birmingham Brass Company, of Shelton, Conn., which was reopened recently after a long period, has again closed its works, owing, it is said, to the present condition of the brass market. This mill was purchased some time ago by The Coe Brass Company, who have been operating it since its purchase.

The Dings Electro-Magnetic Separator Company had a very interesting exhibit at the American Foundrymen's Convention at Milwaukee. They gave out a handsome souvenir in the way of a vest-pocket note-book bound in leather and gold. Mr. Dings wore a satisfied smile at the close of the convention, and reported orders enough on hand to keep them busy for several months.

The E. J. Manville Company, of Waterbury, Conn., manufacturers of presses and brass working machinery of all kinds, have outgrown their present quarters and will move bodily to the corner of East Main and Dublin streets as soon as the necessary buildings can be erected. The present plans now includes the erection of five buildings. The company now employs 120 hands.

The Michigan Steel Boat Company, of Detroit, Mich., is building aluminum canoes, which are 16 feet long, 30 inches wide, 12 inches deep, and weigh 20 pounds. The company claim that they are the handsomest, lightest and most novel canoes on the market.

The Pittsburgh Aluminum Company, of San Francisco, Cal., have been incorporated under the laws of West Virginia, with a capital of $50,000. The company have two aluminum stores in California, one in San Francisco and the other in Los Angeles, and their business has increased every year. In the near future the company expects to open additional stores.

The Wagner Manufacturing Company, of Sidney, O., have just issued Catalogue No. 12, which is more elaborate and tasty than any catalogue ever issued by this company. The first pages are devoted to aluminum ware, and some fifty-three different articles are shown, made in different sizes. The catalogue also sets forth the advantages of aluminum ware, all of which made by the Wagner Manufacturing Company is cast and is of high grade. The company make also aluminum castings for all purposes.

Messrs. Seabrook Brothers & Co., 21 Edmund place, Aldersgate street, London, E. C., write us that they are looking for specialties in aluminum goods, with a view of handling them in Europe on a sole agency basis (buying goods outright, f. o. b., or otherwise). Mr. Herbert Seabrook will be at the Astor House, New York, for several weeks after July 8, and all communications should be addressed to him. Messrs. Seabrook Brothers & Co. state that they can give first-class references from several large American manufacturers.

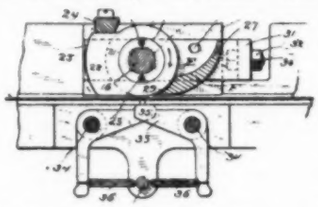
The New Jersey Aluminum Company, of Newark, N. J., have just issued a supplement of their fancy goods catalogue, which shows many new articles that have not been placed on the market. The company finds business pretty brisk for this time of the year, and are getting up new things in the advertising novelty line, including two new signs. It is expected that the new building of the New Jersey Aluminum Company will be finished by August 1. This will increase the company's floor space two-thirds more than what they have at present.

As foreshadowed in a former issue of THE METAL INDUSTRY, the British Government has closed the aluminum department of the School of Arts in Madras, India, and the business of this school has been taken over by the Indian Aluminum Company, of Madras. The company write us that they are very busy in looking after their own orders and those of the School of Arts. They have abandoned fancy work, and are giving their entire attention to the production of household and municipal articles. The Indian Aluminum Company have just issued a price-list for 1903, which shows an increasing number of articles. Specimens of Indian repoussé work were shown in the January number of THE METAL INDUSTRY, and a group of Indian aluminum utensils were shown in THE ALUMINUM WORLD, December, 1901.

PATENTS

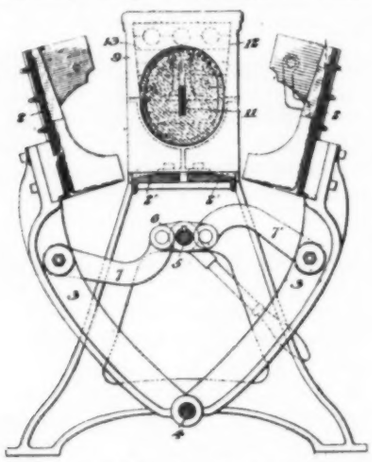
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

728,606, May 19, 1903. MACHINE FOR JAPANNING SMALL ARTICLES.—Thomas A. Perrins, Seymour, Conn. In a machine of the



character described, the combination with a carrying-belt, of a japan-through, a japanning-roller, and non-rotary retaining-plates embracing said roller.

727,556, May 5, 1903. CORE-MAKING MACHINE.—Henry E. Pridmore, Chicago, Ill., assignor to the National Malleable Castings Company, Cleveland, Ohio, a corporation of Ohio. In a core-



molding machine, the combination of a frame, levers fulcrumed in said frame at their lower ends, means whereby said levers are moved, and a core-box having laterally-movable sides carried by said levers.

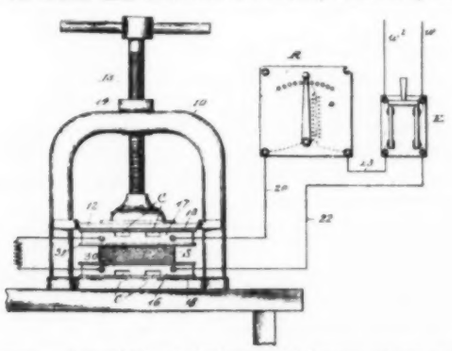
729,617, June 2, 1903. COMPOSITION FOR USE IN PRODUCING METAL CASTINGS.—Calvin W. Link, Jersey City, N. J.

A composition for use in producing metal castings, consisting of sand, corn-oil and kerosene, the corn-oil predominating over the kerosene.

729,637, June 2, 1903. COMPOSITION FOR CORES.—Ed. F. Myers, Akron, Ohio.

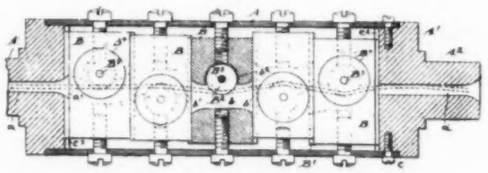
The composition of matter for making cores consisting of dextrine and silica sand or pulverized quartz.

730,314, June 9, 1903. METHOD OF DRYING GOLD-BEATER SKINS.—Ernest H. Swift and Matthew H. Swift, Hartford, Conn.



The improved method of drying gold-beater skins, which consists in compressing a bunch of skins, subjecting the same to a gradually increasing heat, until the maximum temperature consistent with the condition of the skins has been reached, and maintaining said maximum temperature for a predetermined length of time, while the compression of the bunch remains constant.

730,549, June 9, 1903. MACHINE FOR STRAIGHTENING WIRE.—Francis W. Mallett, New York, N. Y., assignor to Ph. J. Bender & Sons, New York, N. Y., a corporation of New York.

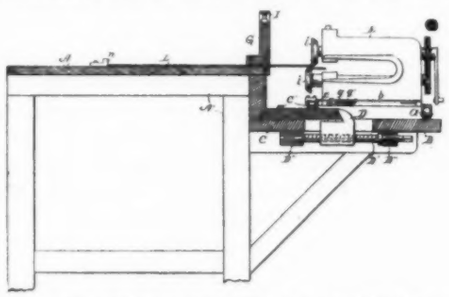


In a machine of the character set forth a series of dies mounted in a revolving carrier and each adjustable transversely thereof, and a series of rollers mounted one in each die, arranged with their axes transverse to the axis of said carrier and adapted to receive the wire at the points of flexion in the latter and facilitate its passage through the machine.

730,218, June 9, 1903. MOLDER'S LADLE.—Winfield S. Anderson, Cincinnati, Ohio.

In a molder's ladle, the combination of a handle, a circular pot-holding band thereon, which is open and has its separated ends overlapping, perforation in these ends adapted to receive a locking pin to hold these ends against movement in endwise direction and means to hold them sidewise one on the other, but in a manner to leave them free to slide endwise.

730,874, June 16, 1903. MACHINE FOR CUTTING SHEET METAL.—Arthur E. Chambers and Lewis H. Bullard, Detroit, Mich.



In a machine for cutting sheet metal, the combination of a table A; means for clamping a sheet of metal thereto; a table B having guides thereon; a cutting machine provided with rotary shears and with wheels or rollers *a*, *c*, *e*; a guide roller *h* supported in line with said shears adapted to engage the guides on said table; guide rollers *f*, *f*, supported on the pivoted bar H adapted to alternately engage the said guide; locking pins *g* for said pivoted bar; and a sliding bar *c* adapted to act upon said locking pins alternately to release said bar H and to act upon said bar to shift the same; all coacting for the purpose specified.

730,979, June 16, 1903. MANUFACTURE OF ALKALI METALS.—Heinrich Specketer and Oskar H. Weber, Griesheim-on-the-Main, Germany, assignors to the firm of Chemische Fabrik Griesheim Electron, Frankfort-on-the-Main, Germany.

The process of producing alkali metal by heating a mixture of aluminum and alkali fluorid in a suitable distilling apparatus.

Metal Prices, July 6, 1903

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malaca	27.85
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	14.00
Electrolytic	13.87½
Casting	13.50
SPELTER—Duty 1c. per lb.	
Western	6.12½
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.40
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	7.50
Hallets	6.75
Other	6.40
NICKEL—Duty 6c. per lb.	
Large lots	40 to 50
Small lots	50 to 60
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.52⅞
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	47.50

Sheet Lead, 7¾c. per lb., 20 per cent. off.
Lead Pipe, 6¾c. per lb., 20 per cent. off.
Zinc—Duty, Sheet, 2c. per lb.; 600-lb. casks, 7.50c. per lb., open, 8c. per lb.
Tobin Bronze—Rods, Unfinished, 19c.
Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16½c.
Phosphor Bronze, Ingots	15 to 18c.
Silicon-Copper, Ingots	34 to 36c.

OLD METALS

	Buying.	Selling.
Heavy Cut Copper	12.00c.	13.00c.
Copper Wire	11.25c.	12.00c.
Light Copper	10.50c.	11.25c.
Heavy Mach. Comp.	10.50c.	11.50c.
Heavy Brass	7.75c.	8.50c.
Light Brass	6.00c.	6.75c.
No. 1 Yellow Brass Turnings	7.25c.	8.00c.
No. 1 Comp. Turnings	9.50c.	10.50c.
Heavy Lead	3.67½c.	3.87½c.
Zinc Scrap	4.12½c.	4.37½c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	16.00c.	20.00c.
Old Nickel	15.00c.	25.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	20	21	21	21	21	22
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	21	21	22
	Longer than 96 ins.	20	21	21	21	21	23
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	20	21	21	21	21	23
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	21	21	23
	Longer than 96 ins. Not longer than 120 ins.	20	21	21	21	22	24
	Longer than 120 ins	20	21	21	22	23	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	20	21	21	22	23	25
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	22	24	26
	Longer than 96 ins. Not longer than 120 ins.	20	21	21	23	25	29
	Longer than 120 ins.	20	21	22	24	27	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	20	21	21	22	24	27
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	23	25	30
	Longer than 96 ins. Not longer than 120 ins.	20	21	22	24	27	
	Longer than 120 ins	21	22	23	25	29	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	20	21	22	24	29	
	Longer than 96 ins. Not longer than 120 ins.	20	21	23	26	31	
	Longer than 120 ins.	21	22	24	29		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	21	22	24	27		
	Longer than 96 ins. Not longer than 120 ins.	22	23	25	28		
	Longer than 120 ins.	23	24	26	30		
Wider than 108 ins.	Not longer than 132 ins.	24	25	27			
	Longer than 132 ins.	25	26	29			

Rolled Round Copper, ⅜ inch diameter or over, 21 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, July 6, 1903

COPPER BOTTOMS, PITS AND FLATS

Net Cash Prices.

14 oz. to square foot, and heavier, per lb.	25c.
12 oz. and up to 14 oz. to square foot, per lb.	26c.
10 oz. and up to 12 oz.	28c.
Lighter than 10 oz.	31c.

Circles less than 8 in diam., 2c. per lb. additional.
Circles over 13 in. diam., are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.31
Above No. 10 to No. 16..	.23½	.27½	.31½
Nos. 17 and 18.	.24	.28	.32
" 19 and 20.	.25	.29	.33
No. 21.	.26	.30	.34
" 22.	.27	.31	.35
" 23.	.28	.32	.36
" 24.	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 40 per cent.

PRICES FOR SEAMLESS BRASS TUBING

From 2 in. to 3¾ in. O. D. Nos. 4 to 12 Stubs Gauge, 19c. per lb. Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturer's List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.....	33	29	30	19	18	18	18	18	18	18	18	20	20	22	24	25

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

Plain	Round	Tube,	¾	in.	up	to	2	in.,	to	No.	19,	inc.	Per lb. $0 35
"	"	"	5/8	"	"		¾	"		"	19,	"	36
"	"	"	⅛	"	"		⅝	"		"	19,	"	38
"	"	"	⅜	"	"		⅛	"		"	19,	"	41
"	"	"		"	"		⅜	"		"	19,	"	48
"	"	"	¼	"	"		⅛	"		"	19,	"	65
"	"	"		"	"		¼	"		"	19,	"	1 06
"	"	"		"	"			"		"	19,	"	1 50

Smaller than ⅛ inch..... Special
2 inch to 3 inch, to No. 19, inclusive..... 38
3 inch..... 40
Over 3 inch to 3½ inch..... 45
Over 3½ inch..... 50

Bronze and copper advance 3 cents. Discount 30 per cent.

PRICE LIST FOR SHEET ALUMINUM

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.

Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Wider Than... And Including...	8 in. 12 in.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in.	40 in. 45 in.	45 in. 50 in.	50 in. 55 in.	55 in. 60 in.	Polishing One Side.	Sat. Fin. without Lacquer. One Side.	Satin Finish two sides double above prices.	Polished two sides double above prices.
No. 13 & heavier.	in coils.	Not wider than 6 in.												2	6		
" 14														2	6		
" 15														2	6		
" 16														2	6		
" 17														2	6		
" 18														2	6		
" 19														2	6		
" 20														2	6		
" 21														2	6		
" 22														2	6		
" 23														2	6		
" 24														2	6		
" 25														2	6		
" 26														2	6		
" 27														2	6		
" 28														2	6		
" 29														2	6		
" 30														2	6		
" 31														2	6		
" 32														2	6		
" 33														2	6		
" 34														2	6		
" 35 & 36	1 67	60	62	66	74	82	77	64	61	64	64	68	70	2	6		
" 37 & 38	1 08	54	56	60	68	70	69	59	58	61	61	64	66	2	6		
" 39 & 40	1 03	52	54	58	64	68	64	58	57	58	58	61	63	2	6		
"008" to .0015"	2 02	56	60	63	66	72	68	61	60	61	61	64	66	2	6		
Less than .0015"	2 02	60	62	66	74	82	77	64	62	64	64	68	70	2	6		

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds	10 per cent. off list.				
1,000 to 2 000 "	10 per cent. and	2	"	"	
2,000 to 4,000 "	10 "	"	3	"	"
4,000 pounds and over	10 "	"	5	"	"

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

THICKNESS OF WALL IN STUBS' GAUGE.

Outside Diameter in Inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in Inches.
1-4	.....	.....	.....	10	9	8	7	1-4
5-16	.....	.....	.....	11	9	8	7	5-16
3-8	.....	.....	.....	12	9	8	7	.....3 8
1-2	.....	.....	17	14	11	9	8	..... 1 2
5-8	.....	.....	21	16	13	12	.....	.....5 8
3-4	.....	.....	25	19	16	14	.....	 3-4
7-8	.....	.....	28	22	18	16	.....	..... 7 8
1	.....	.....	30	25	21	19	.....	.....1 00
1 1-4	.....	.....	36	30	25	.....	.....	.....1 1 4
1 1-2	.....	52	43	35	28	.....	.....	.....1 1-2
1 3-4	.....	60	50	41	33	.....	.....	..... 1 3 4
2	84	68	58	47	37	.....	.....	.....2 00

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter B.& S.G'ge.	0000 to No. 10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., three cents off list.
30,000 lbs. and over, four cents off list.

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

pounds.

t. off list.
"
"

price for

g.

Outside Diameter in Inches.
....1-4
.....5-16
.....3 8
..... 1 2
.....5-8
..... 3-4
.....7-8
.....1 00
.....1 1 4
....1 1-2
... 1 3 4
.....2 00

ge.

No. 1.	No. 22.
47	0 52